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Brassia longissima vs. B. antherotes 121

The name of the Basil-thyme, Acinos arvensis 125

New Cultivars of Woody Ornamentals from Europe 126

The Ophiopogon-Liriope Complex 134

Book Review 159

Index to Volume 9 160

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Brassia longissima vs. B. antherotes

Henry Teuscher[1]

This Brassia was first recognized as an entity by Reichenbach f., who in 1868 (Gardener's Chronicle, p. 1313) described its large-flowered variety as Brassia Lawrenceana var. longissima. He overlooked the fact, not only that B. Lawrenceana is a Brazilian species which has never been found elsewhere, whereas this large-flowered variety came from Central America, but also that the two differ in the formation of the lip callus and in the shape of the lip.

In March 1914, Nash created the species Brassia longissima (in Bailey, Standard Cyclopedia of Horticulture 1: 541) but described the smaller-flowered variety which is more common. He gave the length of the lateral sepals as 18-20 cm. (7 to 8 inches); usually they are from 10 to 18 cm. long. In October 1914, Schlechter, apparently unaware of the change made by Nash, also applied the species name Brassia longissima but described the large-flowered variety which Reichenbach also had had in mind. Its lateral sepals are 25-32 cm. (10 to 13 inches) long.

The confusion which this created was not improved by the fact that in 1922 Schlechter (in Fedde Repertorium, Beiheft 17: 80) described Brassia longissima var. minor, by which he apparently meant the smaller-flowered or more common variety of the species. His description is scanty and consists only of the following: "Differt a forma typica floribus multo minoribus, labello obovato, breviter acuminato, labelli callis basilaribus minute et dense papillosis." Since the two short carinae of the callus are densely short pubescent on all the forms of B. longissima, this does not mean much. Occasionally, on depauperate plants, the lateral sepals of B. longissima are slightly shorter than 10 cm. and it has, therefore, been generally assumed that Schlechter with the above description referred to one such exceptionally small form. His type specimen (at the herbarium of the Berlin Botanical Garden) unfortunately was destroyed in a bombing attack during World War II. However, he makes the following remark with the above quoted description: "Das vorliegende sehr reiche Blutenmaterial ist durchschnittlich Kleiner als das Original, hat aber alle seine Merkmale."

"A great plenty of flowering material" cannot refer to one particularly small form but points definitely towards the smaller-flowered variety which is fairly common in parts of Central and South

[1]Curator, Montreal Botanical Garden, Montreal, Canada.

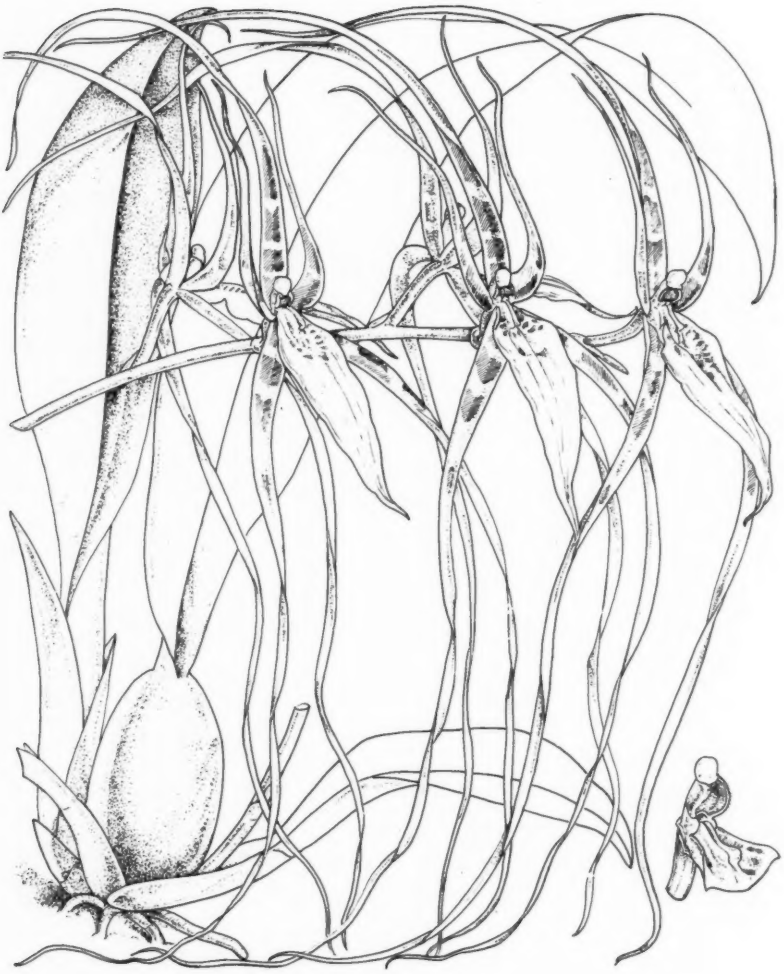


Fig. 42. Brassia antherotes var. longissima. Redrawn from Curtis's Botanical Magazine, Series 3, 25: t. 5748. 1869. ("Brassia Lawrenceana var. longissima.")

America and in which the flowers on an average are hardly more than half the size of those of the large-flowered form. If Schlechter's conception were to be accepted, this would result in the anomaly that the more common smaller-flowered variety would be designated as var. minor, while the large-flowered variety, which is local and uncommon, would be the type of the species.

Fortunately, this need not be considered, because in 1879 (Gardener's Chronicle, new series 12: 782) Reichenbach f. described Brassia antherotes. Apparently, he did not connect it with his B. Lawrenceana var. longissima because this presumably new species came from the Pacific slopes of South America. His type specimen had been collected by Klaboch in Ecuador. The fact, however, that he did describe B. antherotes as a separate species removes all possibly remaining doubt that his name B. Lawrenceana var. longissima referred to the large-flowered form.

I had long been puzzled by Brassia antherotes because I could not understand how it was supposed to differ from B. longissima. In fact, my long and ample correspondence with José Strobel, Ecuador, started in the spring of 1954 with my inquiring for B. antherotes, which I urged him to try to find for me. In 1956 I came to Ecuador myself, and among the many interesting plants I collected was a Brassia which Sr. Strobel and I found in flower shortly below Decur (alt. 3200 ft.), not far from the road Cuenca-Guayaquil. I had grown and studied several forms of B. longissima received from Central America, for several years previous, and, therefore, I recognized this plant immediately as B. longissima, which is very distinct.

The flattened pseudobulbs are always unifoliate, and the lip callus consists of two very short, parallel, white carinae which are velvety-short-pubescent and usually orange-colored on their inside surfaces. There are no upright teeth in front of this callus - instead, each carina has in front a short and very low, usually somewhat sideways diverging, prolongation. The lip is shallowly concave at the base and is rather abruptly widened in front of the callus. From there on it tapers to the thinly tailed apex. The lateral sepals are almost twice as long as the dorsal sepal. The upright petals curve inward and frequently cross over each other in front of the dorsal sepal.

Because until then B. longissima had not been reported from Ecuador, so far as I knew, I sent the inflorescence to L. A. Garay, curator of the Oakes Ames Orchid Herbarium at Harvard University, who wrote me that it agreed perfectly with B. antherotes.

Thus I came to realize that these two species are identical. Further investigation proved this beyond doubt, and I set out to discover why this fact had been so long overlooked.

Since the species epithet antherotes antedates longissima by 35 years, it has unquestioned priority and, what is particularly satisfactory, it applies without doubt to the smaller-flowered variety

which is the more common and more widely distributed. This offers a welcome opportunity to clear up this whole concept as follows:

Brassia antherotes Reichenbach f., Gardener's Chronicle, new series 12: 782. 1879.
Brassia longissima Nash in Bailey, Standard Cyclopedia of Horticulture 1: 541. 1914.
Brassia longissima var. minor Schlechter, Fedde Repertorium, Beiheft 17: 80. 1922.

In addition to the characteristics given above, which apply to all forms equally, the following dimensions may be listed for the typical variety:

Dorsal sepal: 7 to 8.5 or 9 cm. long and 0.4 to 0.45 cm. wide near the base.
Lateral sepals: 10 to 18 or 20 cm. long and 0.45 to 0.5 cm. wide near the base.
Petals: 4.5 to 6 cm. long and 4 cm. wide at the base.
Lip: 4.2 to 5 cm. long and 0.9-1.5 cm. wide directly in front of the callus.

The typical variety is known from Costa Rica, Panama, Colombia, Ecuador, and Peru.

Brassia antherotes var. longissima (Reichenbach f.) Teuscher, comb. nov.
Brassia Lawrenceana var. longissima Reichenbach f., Gardener's Chronicle: 1313. 1868; Hooker f., Curtis's Botanical Magazine 95: t. 5748. 1869.[1]
Brassia longissima Schlechter, Die Orchideen, p. 496. 1914.

Dorsal sepal: 15 to 17 cm. long and to 0.8 cm. wide near the base.
Lateral sepals: 26 to 32 cm. long and 0.8 cm. wide near the base.
Petals: 7 to 8.5 cm. long and 0.6 cm. wide at their widest.
Lip: 6 to 7 cm. long and 1.9 to 2 cm. wide directly in front of callus.

This variety is distinguished most of all by the extremely long and wider sepals, especially the lateral sepals, but it is generally recognizable also by the flattened pseudobulbs, which are almost circular in outline, being shorter and wider than those of the other forms. Its leaves usually are broader. This may well be a polyploid form and is rather spectacularly handsome. We have received plants of it from both Costa Rica and Panama, and it may well occur also in Ecuador and Peru.

[1]Hooker's description seems to have been commonly misunderstood because he does not give the actual length of the lateral sepals, saying merely that the sepals are "upwards of seven inches long." However, the other dimensions he gives, as well as the plate itself, which was drawn life-size, leave no doubt that this represents the larger-flowered variety.

The Name of the Basil-thyme, Acinos arvensis

G. H. M. Lawrence

The characters by which one may separate the genera of the Labiatae now treated as Acinos, Calamintha, Micromeria, and Satureja were clearly set forth in an earlier issue of this journal by De Wolf (Baileya 2: 142-150, 1954).

The basil-thyme was originally named Thymus Acinos by Linnaeus. It was Moench who created for it a new genus apart from Thymus, naming it Acinos and designating the species as Acinos thymoides. This he did in 1794, perhaps unaware that Lamarck had already separated it from Thymus and had named it Calamintha arvensis, in 1778. In 1946 J. E. Dandy pointed out that the earliest epithet available for the plant in the genus Acinos was Lamarck's arvensis, and he made the new combination Acinos arvensis.

This note would not have been written had I not noticed that in Komarov's Flora U.S.S.R., A. G. Borisova accepted the name Acinos thymoides (L.) Moench as the correct name for the species. Since this was published in 1954 and is a more recent treatment than Dandy's, I thought there might be cause for Borisova's choice of name — even though Dandy's combination was not cited in the Russian work.

Borisova cited no Linnaean basionym for the epithet thymoides, but the parenthetical use of Linnaeus' name as one author suggested that Moench had cited an earlier Linnaean name. Examination of Moench's Methodus plantarum (1794) showed this not to be the case, for Moench cited only Thymus Acinos L. as a synonym of his Acinos thymoides. Subsequent search of the literature fails to reveal any Linnaean name for the plant employing the epithet thymoides. One may conclude then, that there is no earlier basionym to justify Borisova's adoption of the name Acinos thymoides (L.) Moench, and that the correct name for the species, when retained in the genus Acinos, remains Acinos arvensis (Lamarck) Dandy.

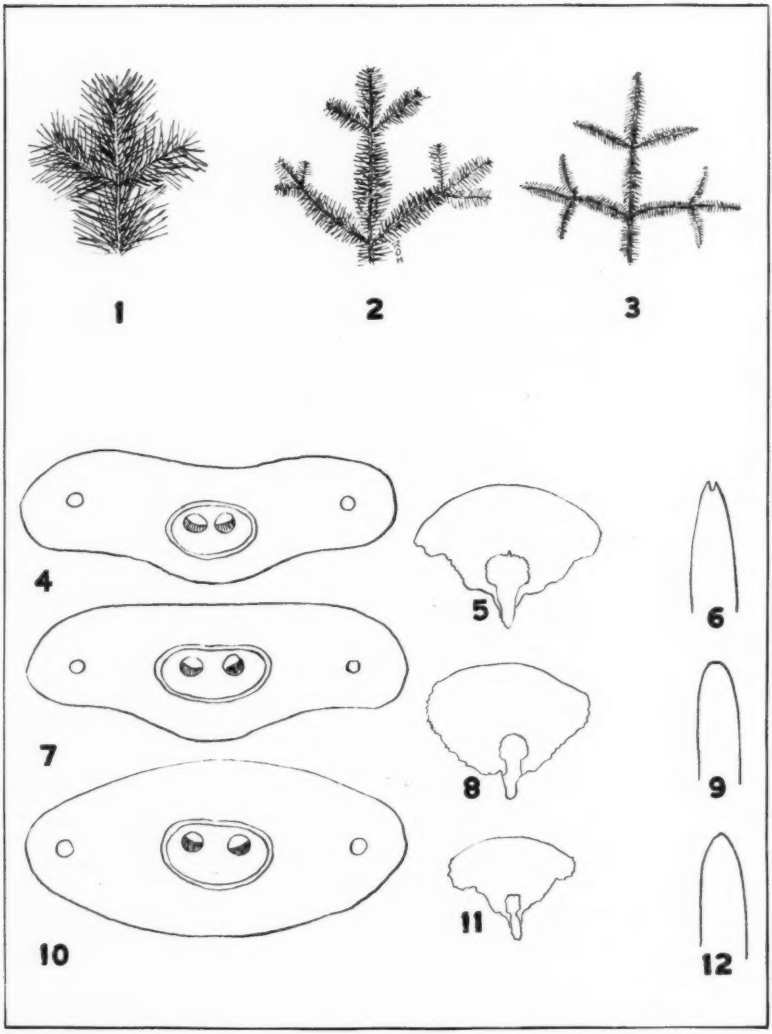


Fig. 43. Comparison of the hybrid Abies × Vasconcellosiana with the parents, A. Pindrow and A. Pinsapo. A. Pindrow: 1, 4, 5, 6 - branch tip, cross-section of leaf, cone-scale, and leaf-tip respectively. A. × Vasconcellosiana: - 2, 7, 8, 9. A. Pinsapo: 3, 10, 11, 12. Redrawn from "Um Novo Abeto Hibrido," by João do Amaral Franco, in Portugaliae Acta Biológica (B) 2 (Fasc. 1/2): 141-156. 1946.

New Cultivars of Woody Ornamentals from Europe

Frederick G. Meyer[1]

The present account attempts to clarify the taxonomic status of a few cultivated plants that came to the attention of the writer on two visits to Europe since 1957 in search for ornamental plants for introduction into the United States.[2] Already these plants have been grown in Europe over some years and now that material has been introduced into the United States, it is fitting to assign a cultivar name for each in accordance with standard practice of perpetuating elite clones in horticulture under Article 11a of the International Code of Nomenclature for cultivated plants, June 1961.

Voucher specimens are on deposit in the herbarium of the U. S. National Arboretum, Washington, D. C.

Abies × Vasconcellosiana Franco 'Amaral Franco' n. cv.

A hybrid derived in cultivation from a spontaneous cross of A. Pindrow (pistillate) × A. Pinsapo (staminate). Evergreen tree, 12 m. or more tall, of pyramidal habit. Leaves 1 to 3 cm. long, obtuse at the tip. Cones 4 to 5 cm. in diameter, at first dark purple, later grayish-violet.

Comparison of the hybrid with the parents

	Leaf length	Leaf tip	Cone
A. × Vasconcellosiana cv. 'Amaral Franco'	1-3 cm.	obtuse	4-5 cm. in diameter; dark purple to grayish violet when young
A. Pindrow	3-7 cm.	emarginate	5-6.5 cm. in diam.; dark violet when young
A. Pinsapo	1-2 cm.	acute	3-4 cm. in diameter; green or glaucescent when young

[1]Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

[2]Program sponsored under a cooperative agreement between Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland, and the Longwood Gardens of Longwood Foundation, Inc., Kennet Square, Pennsylvania.

Voucher specimen: Parque da Pena, Sintra, Portugal, F. G. Meyer 7421.

The cultivar differs from other trees of the hybrid growing in the Parque da Pena by the pyramidal and more dense habit. The cultivar and all other trees of the hybrid are sterile, although cones are abundantly produced from time to time. Seeds collected from the type tree and from some other trees of the hybrid failed to germinate, a condition not uncommon among hybrids. Hybrid vigor is indicated by the more rapid growth rate than in either of the parents.

The hybrid was described first by Prof. João do Amaral Franco in Portugaliae Acta Biologica (B) 2 (fasc. 1/2): 141-156 (1946) from the living trees growing in the Parque da Pena at Sintra, a well-known locality about 40 miles west of Lisbon. Prof. Franco, in his original diagnosis, did not designate individual trees for naming as cultivars. There would probably be little reason now to single out a specific clone for naming except for the fact that material

Fig. 44. Buxus sempervirens cv. 'Heinrich Bruns' (row of fastigiate plants in center of photo) in nursery of Heinrich Bruns, Westerstede, Oldenburg, West Germany.

(see Fig. 101 in Abetos, a monograph by Prof. Franco on the firs [Abies] cultivated in Portugal, in Anais do Instituto Superior de Agronomia, Vol. 17, 1950) has been propagated and plants eventually will become known in cultivation outside of Portugal. The writer, in company with Prof. Franco, obtained material for propagation during his visit to the Parque da Pena in November 1959. The cultivar is described in accordance with standard practice of perpetuating elite clones in horticulture under Article 11a of the International Code of Nomenclature for Cultivated Plants, June 1961.

The cultivar is named for Prof. João do Amaral Franco of the Instituto Superior de Agrònomia, Lisbon, Portugal.

Buxus sempervirens Linnaeus 'Heinrich Bruns' n. cv.

Branches strict, stiff, the new twigs tannish to light rusty-brown. Leaves thick-coriaceous, 1.5 to 2.5 cm. long, cuneate at the base, rounded to emarginate at the tip.

Voucher specimen: From nursery of Heinrich Bruns, Westerstede, Oldenburg, West Germany, September 4, 1959, F. G. Meyer 6798. Plants introduced as P. I.[1] 260383.

A selection of the boxwood, of fastigiate habit and tannish new twigs. Plants require little or no pruning when grown as a hedge.

Chamaecyparis Lawsoniana (A. Murray) Parlatore 'Pena Park' n. cv.

A naturally low, slow-growing variant of the Lawson cypress. The foliage is dark green. The mother specimen divides into 3 principal parts at the base with branches each measuring 30 cm. in diameter. The entire plant measures nearly 35 m. in circumference with a branch-spread of 8 m. The plant stands nearly 2.5 m. tall at about 80 years of age.

Voucher specimen: From Parque da Pena, Sintra, Portugal, F. G. Meyer 7417. Plants introduced as P. I. 269611.

The cultivar is named after the park (Parque da Pena) in which it is maintained.

Crataegus monogyna Jacquin 'Pink Corkscrew' n. cv.

A bizarre selection of the European hedge-row hawthorn with spirally twisted and contorted branches. Leaves green, 3- to 7-lobed, often inrolled and twisted. Flowers pink.

Voucher specimen: F. G. Meyer 7425 from plants grown at Plant Introduction Station, Glenn Dale, Maryland as P. I. 261839, obtained from the Spaargaren Nursery at Boskoop, Netherlands.

[1]Plant Introduction number of the U. S. Department of Agriculture.

Fig. 45. Ginkgo biloba cv. 'St. Cloud', at Jardin Kahn, St. Cloud, Paris, France.

Erica 'Evening Glow' n. cv.

An alleged hybrid of E. cerinthoides Linnaeus, a South African species, with an unknown second parent. Evergreen shrub. Leaves narrowly linear and needle-like, radially arranged, about 7 mm. long, puberulent, light green. Flowers cylindrical, erect, borne in terminal umbels of 5 to 10, 12 to 25 mm. long, opening white, later changing to rose.

Voucher specimen: Palmengarten, Frankfurt-am-Main, West Germany, September 30, 1959, F. G. Meyer 7165. Introduced as P. I. 274445.

The fine display of this heath seen by the writer at the Palmengarten in 1959 prompted an inquiry from Mr. Fritz Encke, the director, as to the name of this outstanding plant. My host explained that although the plant had been cultivated in the Palmengarten for a long time, it was known only as a South African Erica of unknown origin. Herbarium specimens submitted to Dr. E. A. Schelpe, of Cape Town, South Africa, brought the following reply (personal communication): "The specimen submitted is almost certainly a hybrid, with Erica cerinthoides L. as one of the parents. In view of the pale colour, the other parent could be one of a number of large, white or pale flowered species. The abnormal development of the anthers supports its identification as a hybrid." My host in Frankfurt has since agreed to the name 'Evening Glow' as appropriate for this plant, because of the changing colors of the flowers from white to rose.

Ginkgo biloba Linnaeus cv. 'St. Cloud'.

Ginkgo biloba L. 'St. Cloud' (Meyer), Plant Explorations, Ornamentals in Italy, Southern France, Spain, Portugal, England, and Scotland. U. S. Department of Agriculture (ARS 34-9). October 1959. Main trunk strict. Branches at right angles to the trunk or slightly ascending, rarely with secondary branching. Leaves densely and radially disposed, on short-shoots of the main trunk and lateral branches.

Original tree: Jardin Kahn, St. Cloud-sur-Seine, Bois de Boulogne, Paris, France. Introduced as P. I. 242018.

The curious skeletal aspect of the plant and the densely leafy branches are distinctive aspects associated with this seedling selection of the ginkgo.

Roupala macrophylla Pohl cv. 'Corcovadensis'.

Synonym: Rhopala Corcovadensis Hort. ex Meisner in de Candolle, Prodromus 14: 533. 1856.

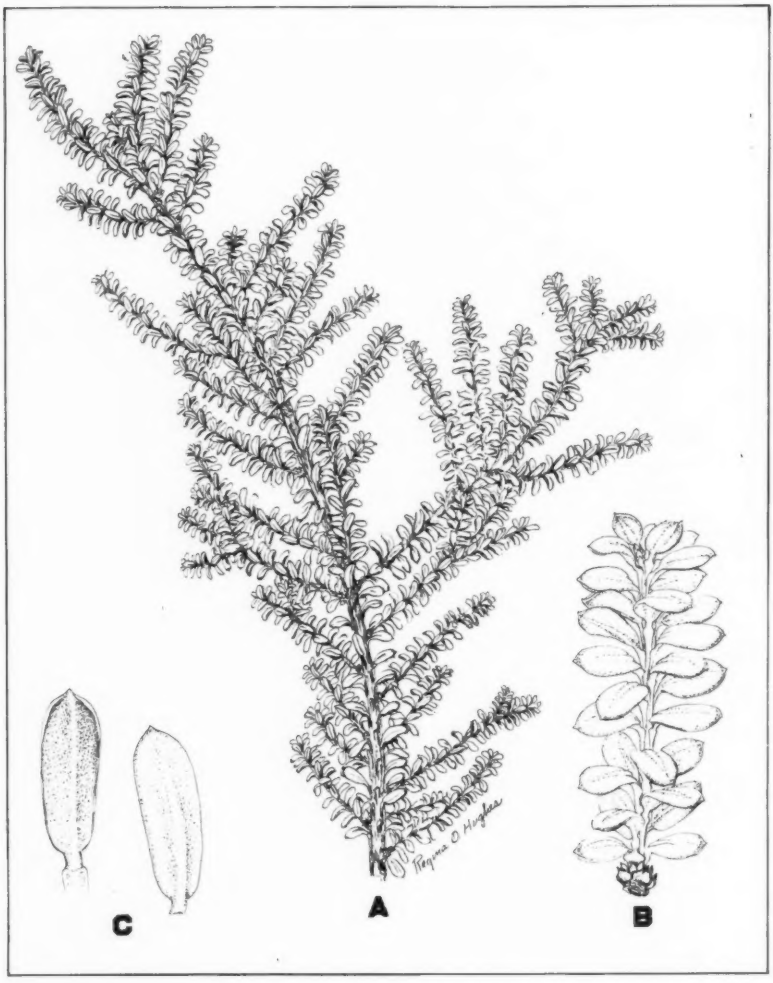


Fig. 46. Taxus baccata cv. 'Amersfoort': A, branch x 1/2; B, twig x 1 1/2; C, leaf, lower side (at left) and upper side (at right) ca. 3 1/2.

Evergreen tree. Shoots densely woolly, rust-colored. Leaves pinnate, about 30 cm. long. Leaflets 11 to 17, 7.5 to 12.5 cm. long, about 7.5 cm. wide, bright green above, paler and at first downy beneath.

Voucher specimen: Greenhouse, Jardin Botanique de l'Etat, Meise, Belgium, F. G. Meyer 7306. Introduced under P. I. 265940 and P. I. 268486. The cultivar represents the pinnate-leaved phase of the species cultivated in greenhouses of Europe for over a century.

Taxus baccata Linnaeus 'Amersfoort' n. cv.

A small, slow-growing evergreen tree, of pyramidal habit, moderately branched. Branches spreading-ascending, stiff, the branchlets 2.5 to 7 cm. long, stiff, green. Leaves numerous, radially disposed on the branchlets, rather strongly arcuate-recurved, oblong to narrowly so or oblong-elliptic, 5 to 8 mm. long, 3 to 4 mm. wide, rounded at the apex, abruptly mucronate, dark glossy green above, lighter beneath, slightly convex with a raised midrib above, the margins involute beneath. The leaves resemble those of T. baccata 'Adpressa', but the two plants are easily distinguished as follows:

	Stature	Leaves
'Amersfoort'	Stiff habit	Radial on branchlets, twice as long as wide
'Adpressa'	Lax habit	Pectinate, 3 times as long as wide

Voucher specimen: Plant about 2 m. tall, grounds of Psychiatric Hospital, Zonenschild, Amersfoort, Netherlands, F. G. Meyer 6538. Plants introduced under P. I. 259956 and P. I. 266781.

This distinct cultivar of the European yew was seen first in the collection of conifers at the Experiment Station, Boskoop, Netherlands, labeled as a species of Podocarpus. Herbarium specimens sent to Dr. Netta Gray of Emory University, specialist in Podocarpus, confirmed that the plant did not belong to this genus. Specimens submitted to Dr. Rudolf Florin at Stockholm, Sweden, and wood samples sent to Dr. William Stern of the Smithsonian Institution, Washington, D. C., indicated the plant to be a species of Taxus, most likely a seedling variant to T. baccata.

Fig. 47. Liriope exiliflora used as a ground-cover around the Agricultural Building, University of Florida, Gainesville, Florida.

The Ophiopogon-Liriope Complex

H. Harold Hume[1]

The title of this article may appear strange. It is used here because botanists, who have written about these plants, have sometimes thrown the two genera Ophiopogon and Liriope, related plants of the lily family, into a single genus and have applied a number of different generic names to them. The species belonging to them have also been given, in some instances, a number of different names. It was pointed out by Dr. L. H. Bailey that six or seven different botanical designations have been applied to the plant now known as Ophiopogon japonicus. Some of the difficulties may have been due to studies based on herbarium specimens. Small size of the flower parts, even when fully open, make determination of their structure and peculiarities difficult in dried material. Differences can be detected easily in fresh, living flowers that are not readily made out after the latter have been dried and fastened to an herbarium sheet. When peculiarities are seen clearly, in fresh flowers, as they can be under magnification, they can also be made out in dried ones. It is worth pointing out that flowers of several different species of Liriope resemble one another so closely in form that individual flowers might be substituted one for another.

Studies of these plants by Dr. L. H. Bailey culminated in his publication "The Case of Ophiopogon and Liriope," Gentes Herbarum, February 1929. This discussion emphasized botanical features and relationships of these plants. Since that date, little has been published about them. In the interim, a considerable number of garden varieties have been selected and propagated and more has been learned about their behavior in gardens in the last thirty years than was known prior to that date.

Common and Botanical Names.

Several vernacular names have been applied to these plants. Engelbert Kaempfer, a physician of the Dutch East India Company

[1]Dean Emeritus, College of Agriculture, University of Florida, Gainesville, Florida.

who was stationed in Japan (1690-92), published in his Amoenitatum Exoticarum (1712) a Japanese name, Riuno Fige, which he also spelled Rjuno Fige, for the plant now known as Q. japonicus. He translated the Japanese name to Latin as "Barba Serpentina," (Beard of a Serpent). The Greek generic name Ophiopogon (ophis - snake, pogon - beard) given by Ker-Gawler has the same meaning and has become "snake's-beard" in English. The reason for the name is obscure. There is the possibility that the name Riuno Fige was given in Japan because the flower buds of one of them, Ophiopogon Jaburan, especially when advanced toward opening, resemble, in outline, a snake's head and the somewhat tangled mass of buds in different stages of development may have suggested a beard. If the name were translated "a beard of snakes" it might be more appropriate. It is of interest to note that in four different languages names have been given these plants -Riuno Fige (Japanese), Barba Serpentina (Latin), Ophiopogon (Greek), and snake's-beard (English) - all with the same meaning.

Another Japanese name, Mondo, also was used by Kaempfer. This was taken up as a generic designation by Michel Adanson (Familles des Plantes 2: 496. 1763). It was used by O. A. Farwell (American Midland Naturalist 7: 42. 1921), and by L. H. Bailey (Gentes Herbarum 2: 7. February 1929). The use of Mondo must be abandoned, however, for the International Botanical Congress which met in Amsterdam in 1935 conserved the name Ophiopogon, a name given by John Bellenden Ker-Gawler (Botanical Magazine t. 1063. 1808). Other generic names, Convallaria, Fluggea, Polygonastrum, and Slateria, also have been applied, but none has come into wide use. Some of them were misapplied but all have been discarded by the action of the Congress.

Plants of the other genus of lily-turfs bear the name Liriope. This commemorates the beautiful nymph Liriope of Greek mythology. It was first used by Loureiro (Flora Cochinchinensis. 200. 1790). Apparently the name has not been questioned except when plants assigned to it have been transferred to Ophiopogon.

Since the foliage of these plants resembles the leaves of different kinds of grass, the name "grass," often in combination with another word, has been applied to them. Graminifolia, literally "grass-leaved," is a Latin epithet given by Linnaeus to one of the group. J. H. Baker limited this specific name to the species Liriope graminifolia but it has been extended and used by other writers for other species and varieties, from time to time. E. H. Wilson[1] wrote, "Table grass (Liriope spicata) is admired for its graceful habit and is placed on a desk or table to afford rest to the eyes when reading or studying."

[1]A Naturalist in Western China 2: 44. 1913; and China, Mother of Gardens, p. 324. 1929.

Fig. 48. Liriope gigantea: parent clump at left, two new plants from it at right.

The name mondo grass has been used for O. japonicus by some plant growers in the United States who have offered it for sale. The name is fitting enough as it has several grass characteristics, but it belongs to the lily family (Liliaceae) and not to the grass family.

Dr. L. H. Bailey, because of a similarity in growth habits, applied the common name lily-turf to plants of both genera. Since they are liliaceous plants and are turf-forming, some of them particularly so, the appropriateness of this common name is apparent.

The Two Genera

Ophiopogon.

Perennial, stemless, cespitose or rhizomatous herbaceous plants; leaves grass-like from subsurface rootstocks; roots fibrous; flowers racemose, pendent on curved pedicels, fascicled, each group subtended by a foliaceous bract, perianth attenuate and curved basally, forming with pedicel the fruit-stalk; ovary sub-inferior; filaments very short, practically none, anthers sharp-pointed, closely surrounding the style; style projecting slightly beyond the anthers; ovary 6-celled, fruit single-seeded, blue.

Liriope.

Perennial, stemless, cespitose or rhizomatous herbaceous plants with grass-like foliage from subsurface rootstocks; roots fibrous with tuber-like growths; flowers patent, racemose, in fascicles, set at an angle of 45° on erect scapes; style curved, anthers bunched, blunt, filaments curved, longer than the anthers, both stigma and anthers pointing toward rachis; ovary superior with 6 carpels, perianth tubeless or with very short basal projection, pedicels straight or slightly curved, fruit drupe-like, black.

First consideration in separating species belonging to the two genera should be given to their growth habit. All have grass-like foliage and consequently at a casual glance may appear to be much alike, but examination reveals that some grow in clumps (cespitose) that increase in size slowly whereas others are rhizomatous, i.e., produce rhizomes by means of which they spread to adjoining areas. Of cespitose species, examples are O. Jaburan and L. Muscari, while O. japonicus and L. spicata are rhizomatous. This distinction is important, for cespitose plants in their growth do not give rise to rhizomatous forms and the reverse also is true. Unless hybridization has taken place, and there is no evidence that it ever has, it will be found that seedlings of plants belonging to each group follow the growth habit of the form that produced the seed.

Since plants of the two genera are much alike in their foliage, the most important place to find reliable generic distinctions is in flower structure. Flowers of the genus Ophiopogon, as represented

Fig. 49. Inflorescences of Liriope Muscari cv. 'Monroe No. 2' (at left) and Ophiopogon Jaburan (at right).

by Q. Jaburan and Q. japonicus, have the basal part of the perianth elongated into a tube-like portion of some length, whereas in Liriope there is no prolongation of the perianth or only a very short one, a millimeter or so in length. In Ophiopogon it is to be noted that the basal extension of the perianth becomes a part of the stalk of the fruit, the remainder being the true pedicel of the flower. The flowers of Ophiopogon are drooping; in Liriope they are borne on short pedicels and set full-faced against the rachis at an angle of about 45°.

In Ophiopogon the stamen-filaments are very short, so short that the pointed anthers appear to be sessile, while the filaments in Liriope are curved and about 1.5 mm. long, somewhat longer than the anthers. The three in front of the ovary are curved in a simple arc while those at the back of the ovary, i.e., those nearest the rachis, approach the letter "S" in shape. These peculiarities result in the six anthers' being bunched together with their apices pointing toward the rachis. The style in Liriope also is bent, with the stigmatic surface projecting slightly beyond the anthers and pointing toward the rachis. The style in Ophiopogon is straight or only slightly curved.

Opening of the flowers in the racemes of both species is interesting. They do not reach anthesis in sequence up or down the rachis. They open, spaced irregularly in the raceme. At one and the same time a flower may be open at the base, another near the apex, and one halfway or so between.

Ophiopogon

Ophiopogon Jaburan Loddiges, Botanical Cabinet 19: t. 1876. 1832.

Cespitose, in time forming a large clump; roots without tubers, fibrous, abundant from stout rootstock; leaves dark green, to 86.7 cm. long, or somewhat more, and 8 to 20 mm. wide, curved, hard, firm, canaliculate above, striated beneath with about 17 striae, midrib not clearly defined, margins hyaline, rough, somewhat serrulate, apex tapered to a narrow point; scape declinate, flat, sharply edged, to 62 cm. long and 7 mm. wide, light green; raceme to 15 cm. long, open, one-sided, rachis flattened, ridged, fascicles 4- to 8-flowered, bracts light green with light tan membraneous margins, usually 1.5 to 2 cm. long, sometimes longer; flowers white, drooping, to 1.5 cm. wide across the perianth, perianth-parts reflexed, inner ones more so than the outer, surface undulate, basal extension white, becoming green after flower fades, slender, 1 cm. long, curved, forming an arc with pedicel, sometimes a half-circle, pedicel 10 to 12 mm., filaments very short, 1 mm. or less, anthers greenish, sharp-pointed, central in compact circle around the style, style straight, extending about 2 mm. beyond anther-tips; fruit ellipsoid, 1 to 1.5 cm. long, dark violet; seed white, nearly as large as the fruit.

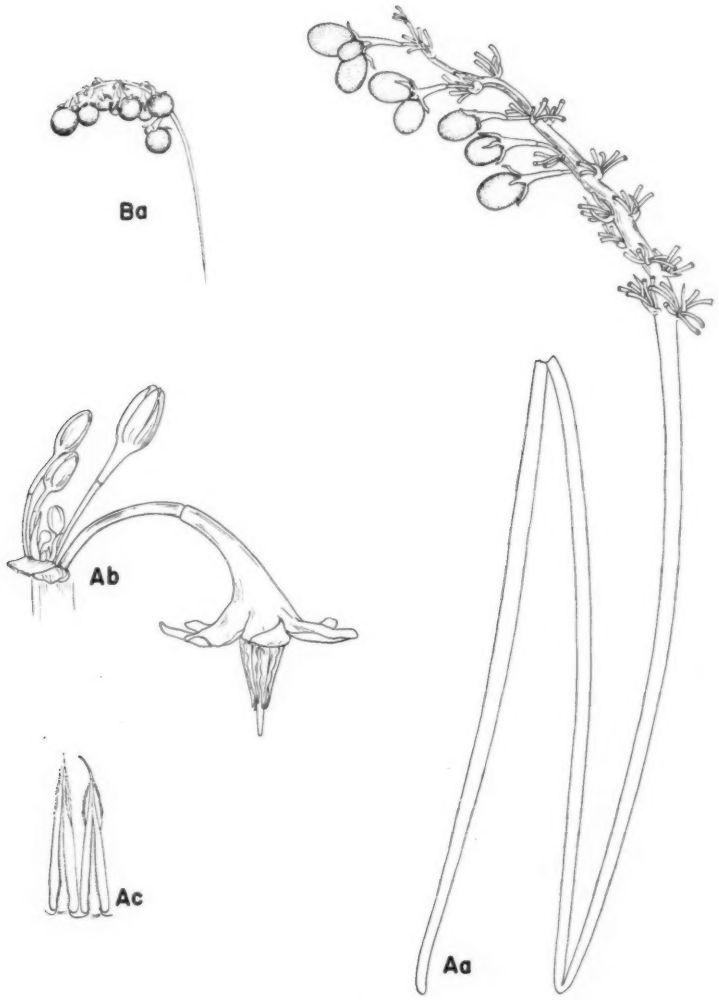


Fig. 50. A, Ophiopogon Jaburan: a, raceme with fruits (one, two, or three on a pedicel) x 1/2; b, fascicle of buds and open flower x 2 (note curvature of pedicel and base of flower, and stamens clustered around style); c, stamens x 4. B, Ophiopogon japonicus: a, raceme with fruits x 1/2.

A mutant or sport of Q. Jaburan, cultivar 'Vittata', has leaves that when young are variegated with white stripes of various widths. It is an anomolous plant with green leaves, producing variegated leaves that become self-green later. In all other details it is an exact duplicate of the species. In the open garden, clumps of Q. Jaburan have been measured 75 cm. high and nearly 2 meters wide, best grown in shade in the Lower South as foliage is subject to burning in full sunshine. 'Vittata' is the only variation known at this time.

Ophiopogon japonicus Ker-Gawler, Botanical Magazine t. 1063. 1808.

Plant rhizomatous with slender rhizomes spreading widely under ground, covered by an inch or so of soil, forming grass-like areas; roots slender, cord-like, provided here and there with budless tuber-like swellings; foliage dense; leaves numerous, 15 to 25 cm. long by 3 to 3.5 mm. wide, dark green above, lighter beneath, striated with 5 striae, the central stria clearly defined above, apices tapered, leaves with thin tissue along edges from basal end upward

Fig. 51. Ophiopogon japonicus lawn, Jacksonville, Florida.

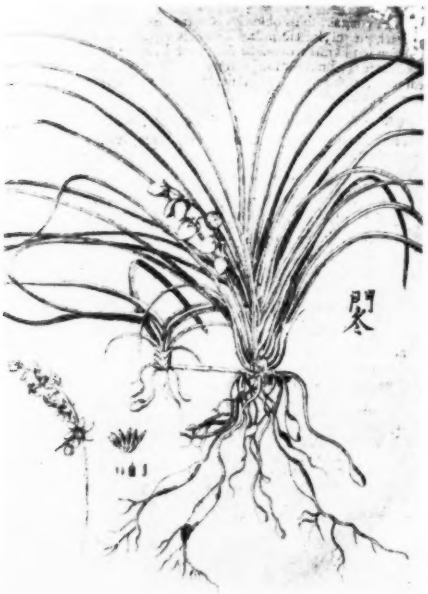


Fig. 52. Ophiopogon japonicus, as illustrated by Kaempfer, 1712. This is probably the first illustration of this plant to appear in Western literature.

for about 25 mm., margins rough with minute, sharp, hyaline serrations, surface rough to the touch; scapes slender, short, flattened, green; racemes short, hidden among the leaves; rachis usually curved, flat, green, 3-4 cm. long; flower fascicles in groups of two or three, each fascicle subtended by a thin bract 6-7 mm. long, acuminate; flowers light lilac, 7-8 mm. expanded, tepals recurved, pedicel curved, both tube and pedicel becoming green and together forming stalk of fruit, 4 mm. long; fruit globose, 7-10 mm., blue; seed globose, pearl-white.

Dr. L. H. Bailey proposed for this the common name "dwarf lily-turf," a name accepted by Standardized Plant Names. It has been handled in the nursery trade as mondo-grass, a name by no means inappropriate even though it is a liliaceous plant. It certainly is grass-like in growth. It has been illustrated by Kaempfer (1712) and more recently by Ker-Gawler (1808) and Bailey (1929).

In the Lower South, particularly in Jacksonville, Florida, Mobile, Alabama, New Orleans, Louisiana, and Thomasville, Georgia, it has been used extensively as a ground cover.

No varieties, botanical or horticultural, have come to light during this study. A variegated sort is mentioned in literature but it has not been found recently.

Ophiopogon arabicus

Plant rhizomatous with short rhizomes; rootstock vertical; leaves to 25 cm. long by 6 mm. wide, upper surface smooth, black, greenish at base, lower surface lighter, striated, apex tapered, blunt; scape erect, subterete, to 7 cm. long, striated; rachis to 4.5 cm. long, striated, curved, black; flowers 2 in each fascicle subtended by small black bracts; pedicel jet-black, 2 mm. long, curved and turning flower downward; perianth expanded 9 mm. with prolongation 1.5 mm. long; perianth parts white, faintly flushed lilac, waxy, opening to 45° angle; fruit not seen.

This species is handled in the California plant trade under the name O. arabicus and is said to have come from Japan. Publication of the name with botanical description has not been found. Mr. J. Robert Sealy of the Royal Botanic Gardens at Kew, England, has made diligent search of the botanical literature and the records being assembled for the next supplement of Index Kewensis, without finding a description. He also has pointed out that no species of Ophiopogon is known from the Arab countries.

Liriope

Liriope exiliflora (Bailey) n. comb.

Convallaria spicata Thunberg, Flora Japonica: 141. 1784.

Liriope Muscari var. exiliflora Bailey, Gentes Herbarum 2: 37. 1929.

Rhizomatous, perennial, herbaceous plant with short rhizomes spreading to form a dense turf with compact leaf mass 15 to 20 cm. deep; leaves dark green, to 43 cm. long by 9 to 12 mm. wide, center area depressed on upper surface, midvein elevated on lower surface, paralleled by 4 to 6 prominent striae, base tapered, apex tapered, blunt; scape violet-brown, green in upper part, to 30 cm. long, erect, carrying racemes well above foliage mass; racemes open, uniform in shape, cylindrical, 8 to 16.5 cm. long, apex pointed; rachis somewhat angled, twisted on its axis, violet, darker toward base, fascicles with 4 to 6 (mostly 5) buds or flowers, widely spaced particularly in the lower part, more compact toward apex, flower 7 to 9 mm. expanded, violet (R. H. S. Horticultural Colour Chart 36-2-3), basal projection of perianth well defined, short, 1 mm. long; fruit fairly abundant, small, 6 to 8 mm. in diameter, globose,

Fig. 53. Liriope exiliflora blooms abundantly. The racemes are borne well above the foliage.

Fig. 54. A, Liriope Muscari racemes, showing various apices and closely spaced flowers. B. Liriope exiliflora racemes, showing irregular distribution of open flowers.

black; seed single and slightly smaller than fruit. In the Lower South it is commoner than any other species of Liriope. It is very constant in growth habit and raceme form.

This species was described by Carl Thunberg as Convallaria spicata in Flora Japonica, p. 141, 1784. As it is not a lily-of-the-valley, Dr. L. H. Bailey placed it as Liriope Muscari var. exiliflora. However, it cannot be a variety of L. Muscari because L. Muscari is a cespitose plant, whereas the plant under discussion is rhizomatous. Figure 7, of L. exiliflora, in Dr. Bailey's paper shows a piece of rhizome attached to the base of the segment. This illustration was made from a photograph of the specimen that Thunberg had classified as Convallaria spicata. Dr. George H. M. Lawrence, former Director of the L. H. Bailey Hortorium, kindly lent the photograph from which the illustration was made. In it the rhizome is even more distinct than in the figure made from it. As shown in the following table of comparisons, there are other differences between L. Muscari and L. exiliflora. These notes are based on a large number of plants and many hundred racemes at Gainesville, Florida, September 11, 1958.

Fig. 55. Liriope exiliflora, showing spreading by means of rhizomes. The parent division is at left.

L. Muscari	L. exiliflora
1. Cespitose - forming large clumps, no rhizomes.	1. Rhizomatous - forming dense turf from short rhizomes.
2. Leaves large, usually 10 to 20 mm. wide, and to 59 cm. long, green.	2. Leaves smaller, narrower, shorter. Usually 8 to 12 mm. wide and to 45 cm. long, darker green.
3. Racemes variable in shape of apex, some pointed, others blunt, some cockscomb, in large clumps, rising but little above the decumbent leafage.	3. Racemes constant in shape, cylindrical with pointed apex, carried well above foliage.
4. Flower fascicles with 4 to 7 buds and flowers, closely together on rachis, forming compact racemes.	4. Flower fascicles scattered or widely separated on rachis, mostly 5 buds and flowers in each fascicle.
5. Perianth without basal projection, the perianth set directly on top of pedicel.	5. Perianth with well-defined basal projection 1 mm. long.
6. Color: raceme of buds and flowers dark violet.	6. Color: raceme light violet.
7. Flowering season: July and August.	7. Flowering season: somewhat earlier and shorter than that of L. Muscari.
8. Fruits large, not abundant.	8. Fruits smaller, plentiful.

Liriope gigantea n. sp.

Herba rhizomata, foliis atroviridibus, ad 65 cm. longis, 12-17 mm. latis, subtus ferme 10-striatis, supra subtiliter asperis, marginibus minute serratis, scapo gracili, 14-19.5 cm. longo, fructificante demisso, florum fasciculis dispersis, 2-5-floris, fructibus abundantibus, 1-6 in pedicelo quoque; speciebus aliis tempore florescendi et fructus maturos ferendi praecedens.

Rhizomatous plant with stout, widely spreading rhizomes, in time forming a dense matted turf; leaves with upper surface dark green, under surface lighter, to 65 cm. long, 12-17 mm. wide, greatest width at a point about 1/3 of length back from apex, gradually tapered to base, apex tapered, blunt, rounded, under-surface striated with about 10 striae, upper surface rough to the touch, margins serrulate with numerous fine, sharp, hyaline serrulations; scape slender, 14-19.5 mm. long, dark purplish-brown; rachis to 11.5 mm. long, somewhat zigzag; flower fascicles widely separated,

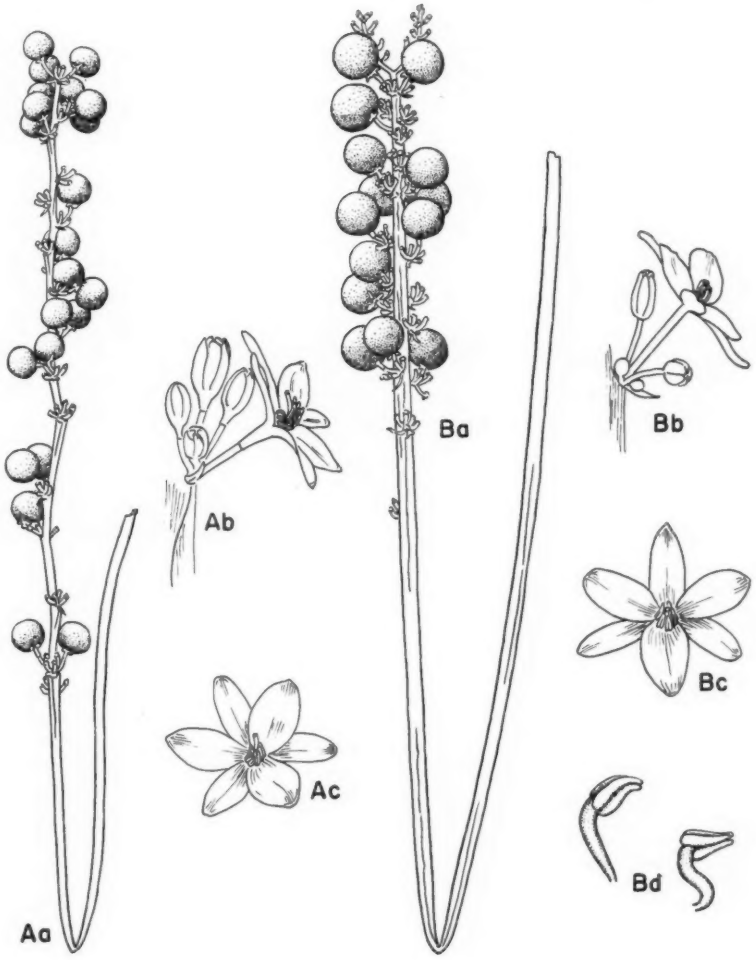


Fig. 56. A, Liriope exiliflora: a, raceme, with typically scattered fruits x 3/4; b, fascicle of buds and flower x 3; c, flower, face view x 3. B, Liriope Muscari: a, scape x 3/4; b, fascicle of buds and flower x 3; c, flower, face view x 3; d, stamens, showing curvature of filaments x 6.

2- to 5- (mostly 3-4-) flowered; flower-buds light violet; flowers light violet, patent, 9-10 mm. across, perianth-segments ovate with rounded apices, inner ones wider than outer; fruit abundant, 1-6 on a pedicel, seldom 1, very frequently 6, with as many as 45 on a single rachis; scape slender, unable to support weight of fruit, so that clusters fall over on ground or leaf mass; flowers produced earlier in the season than those of any other species growing under same conditions; fruit also ripening ahead of that of L. Muscari, L. spicata, L. graminifolia, and L. exiliflora.

This particular Liriope is distinct from the other four species now known to be growing in the United States, and no description fitting it has been found in the literature. The source from which it came originally is obscure. It was found growing in a small area near the house at Millpond Plantation, Thomasville, Georgia. Mr A. F. Wilkinson, who was superintendent of Millpond Plantation for 40 years, says in a letter dated October 21, 1960, that "The original Ophiopogons, I believe, came from France when the gardens were first landscaped some 54 years ago." This would place the planting at Millpond in 1906 or thereabouts.

Plants of L. gigantea were collected at Millpond Plantation, Thomasville, Georgia, July 24, 1957, taken to Gainesville, Florida, and planted at 1103 S. W. 2nd Avenue. One of these was collected July 15, 1961, as the type specimen. It is No. 81458 in the herbarium, University of Florida, Gainesville, Florida.

Liriope graminifolia (Linnaeus) Baker, Journal of the Linnean Society, Botany, 17: 499. 1879.

Asparagus graminifolius Linnaeus, Species Plantarum, ed. 2: 450. 1762.

Rhizomatous perennial forming turf from slender rhizomes; leaves green, 35-40 cm. long by 3-5 mm. wide, apices tapered, blunt, margins serrulate with tiny hyaline serrulations, midrib narrow, slightly elevated beneath, with 4 or 5 fine parallel striae, bases with thin, brown membraneous tissue attached; scape slender, 1 mm. or slightly more in diameter, terete, 12-15 cm. long, green tinted with violet; raceme 3.5-6.2 cm. long, slender, rachis slender, fascicles 3-5, mostly 3-flowered, spaced well apart, forming an open raceme, bracts 4 mm. long, thin, pointed; flowers cup-shaped, light violet, almost white, basal projection short, well defined, pedicel short, 2 mm., slender.

This description is based on specimens received from Eugene Griffith, U. S. Plant Introduction Station, Glenn Dale, Maryland. They grew in an abandoned nursery where they were crowded by weeds of various sorts. Plants have persisted there for years under difficult environmental conditions. Specimens in the herbarium at the United States National Arboretum also have been examined.

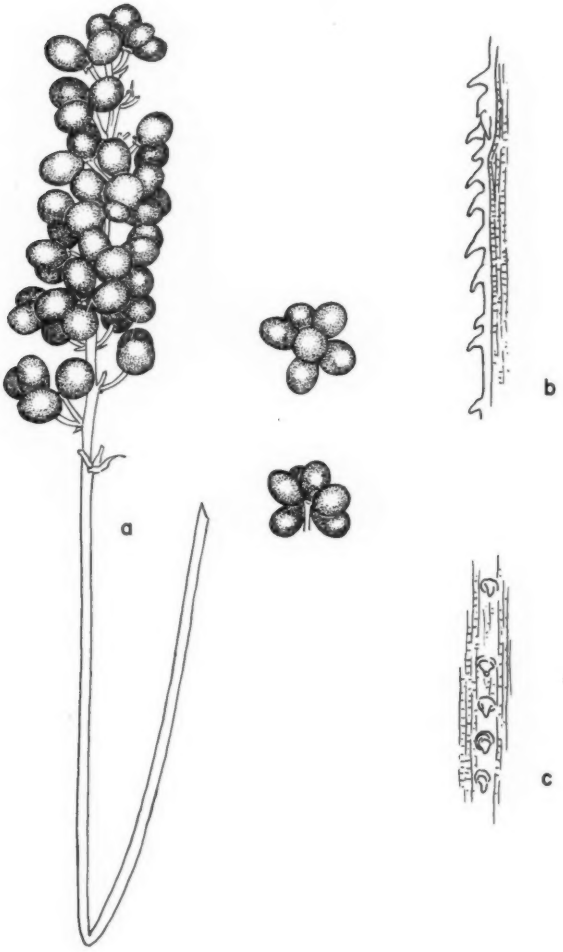


Fig. 57. Liriope gigantea: a, raceme with fruits (as many as six on one pedicel were found in this raceme); b, margin of leaf, showing crenulations, greatly magnified; c, surface of leaf, greatly magnified.

Liriope graminifolia is similar to but different from L. spicata. It differs in its longer leaves, more open raceme, and membraneous growth on edges of leaves at their bases.

Liriope Muscari (Decaisne) L. H. Bailey, Gentes Herbarum 2: 35. 1929.

Ophiopogon Muscari Decaisne, Flore des Serres 17: 181. 1868.

Cespitose, in time forming a large compact clump; leaves green, 24-57 cm. long by 1-2 cm. wide, mostly about 1.5 cm., curved, upper surface shallowly channeled, midrib prominent beneath, with a number (about 10) of lateral striae, apex blunt, rounded, scapes 15-30 cm. long, stout, 3-5 mm. in diameter, erect, greenish-violet, ridged; rachis stout, ridged, violet, sometimes branched at apex; raceme cylindrical, 2 cm. wide, pointed, blunt or cockscomb at apex, 8-12 cm. long, borne among or somewhat above the declinate leaves; fascicles with 4-7 buds and flowers, usually 6, closely placed; flowers violet, patent, 10-11 mm. wide, perianth without tube, tepals united and thickened at base, borne directly on top of pedicel, stamens in horseshoe-shaped cluster with curved style occupying the open, upward space, filaments deep violet, fruit 1-4 on a single pedicel, black, shining, globose 5-8 mm. diameter.

Liriope Muscari cv. 'Variegata' has leaves which are striped light yellow on the edges, the stripes to 2 mm. wide or slightly wider, becoming white later and turning to over-all green after the first season. Apparently it is not a mutant of L. Muscari. It probably is a seedling of that species.

Garden Varieties Derived from L. Muscari.

There are a considerable number of garden varieties of L. Muscari, most of them of fortuitous origin. They have been found in gardens here and there, particularly in the Lower South, selected and propagated because they differed from other forms.

'Big Blue' is the common garden name of the typical L. Muscari under which a detailed description is given. It is strong-growing, forming large bunches with age. In small clumps the racemes of flowers are carried well above the foliage but in old clumps they are not and even may be hidden partially among the leaves. It is found here and there in southern gardens but is much less common than L. exiliflora. From seeds of 'Big Blue' a considerable number of garden varieties have arisen, all of which are cespitose.

'Blue Spire'. This liriope grows in compact bunches with the racemes carried well above the mass of leafage. Fascicles of flowers and buds in the lower part of racemes are openly spread, compact above. Frequently the rachis is branched toward the tip, giv-

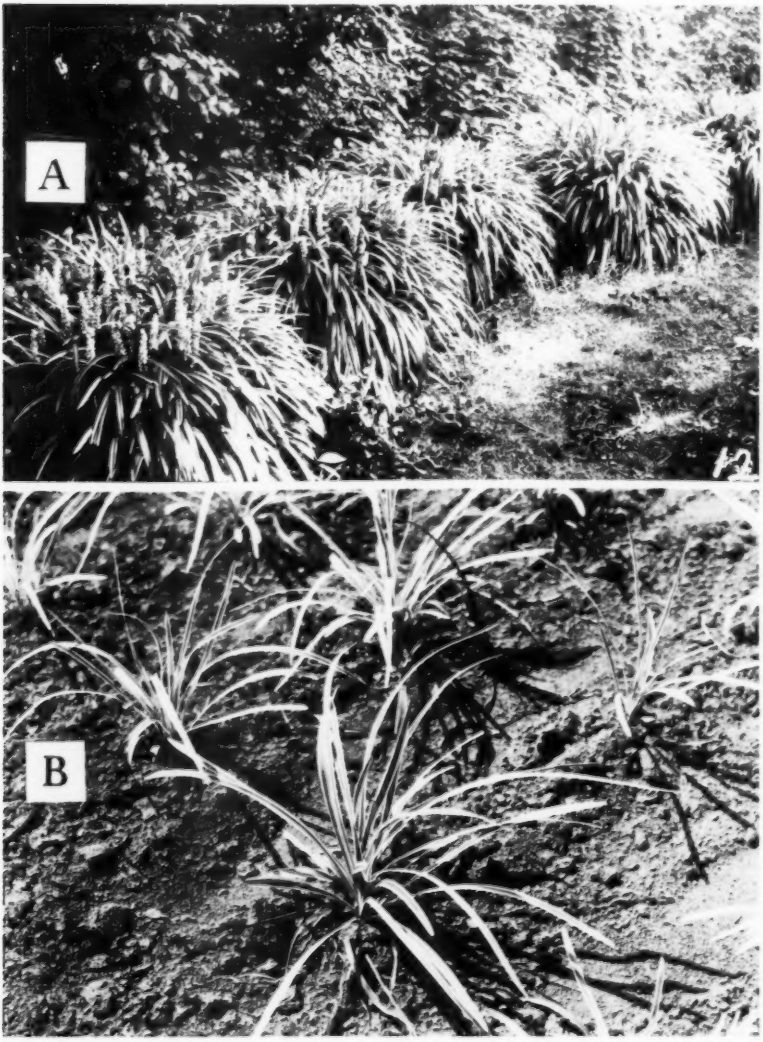


Fig. 58. Liriope Muscari. A, Large old clumps, showing habit of growth and racemes partially hidden among leaves. B, Cv. 'Variegata'. With age, the leaves become green throughout.

ing the 17 mm. raceme a cockscomb effect; color dark violet. Blooming earlier than 'Big Blue'. Introduced by Thomasville Nurseries.

'Curly Twist' is a strong-growing variety with unusual leaves. Many of them are twisted and curled on their axes. The scapes are short so that the racemes rise little or not at all above the upper level of the foliage. Flowers are cupped, i.e., not opening widely. It is an introduction of Riegel Plant Company.

'Eleven-O-Three'. The leaves of this variety are long and narrow, forming a rather open clump. Scapes measure to 26 mm. long and the rather open racemes are 10-19.5 cm. in length. The flowers are light violet with pedicels 4-6 mm. long; fruit black, 10 mm. in diameter. In 1957 it flowered after 'Big Blue' was through, but in 1958 the two varieties overlapped in blooming. It is a chance seedling of L. Muscari found at 1103 S. W. 2nd Avenue, Gainesville, Florida. Noteworthy for its very long racemes of flowers that stand up well over the foliage mass.

'Gold-banded' forms compact clumps of firm leaves to 35 cm. long with a narrow yellow stripe along the margins. Scapes are stout, angled, erect, to 12.5 cm. long, dark violet-purple in color. The flowers and flower buds are violet-purple, borne in fascicles mostly of 5 or occasionally 6, in lower parts, diminishing to 2 or 3 toward the tip. The flower has a short (1 mm.) well-defined projection at base of perianth. As in 'Variegata', the leaves lose their narrow yellow stripe with age, becoming green in over-all color. Introduced by Riegel Plant Company.

'Lilac Beauty'. Noteworthy for its long scapes (to 28 cm.) that carry the racemes of flowers well above the leaf mass. The scapes are stout, rigid, dark brownish-violet in color. The racemes are 10-12 cm. long. An attractive cultivar with showy racemes of dark violet flowers. Occasionally the rachises are branched at their apices. Introduced by Riegel Plant Company.

'Majestic'. This cultivar resembles 'Big Blue' in many respects and it may be that in some cases the two have been intermixed. It is lower-growing than 'Big Blue', less robust, forming compact clumps made up of large numbers of divisions. It blooms freely and shows its racemes to good advantage. Most racemes are cockscomb in form due to branching of the rachises toward the tips. Buds and flowers violet. Introduced by Russell Gardens.

'Monroe No. 1' ('Monroe White'). Of all the garden varieties derived from L. Muscari, this is one of the most distinct. Like all other seedlings of 'Big Blue' it forms clumps. The leaves are lighter green than those of other sorts. The scape is stiff, light green, and carries the raceme of flowers well above the level of the curved foliage. Rachis, flower buds, and flowers are pure white. In them there is no hint of violet color. Raceme somewhat open, not so com-

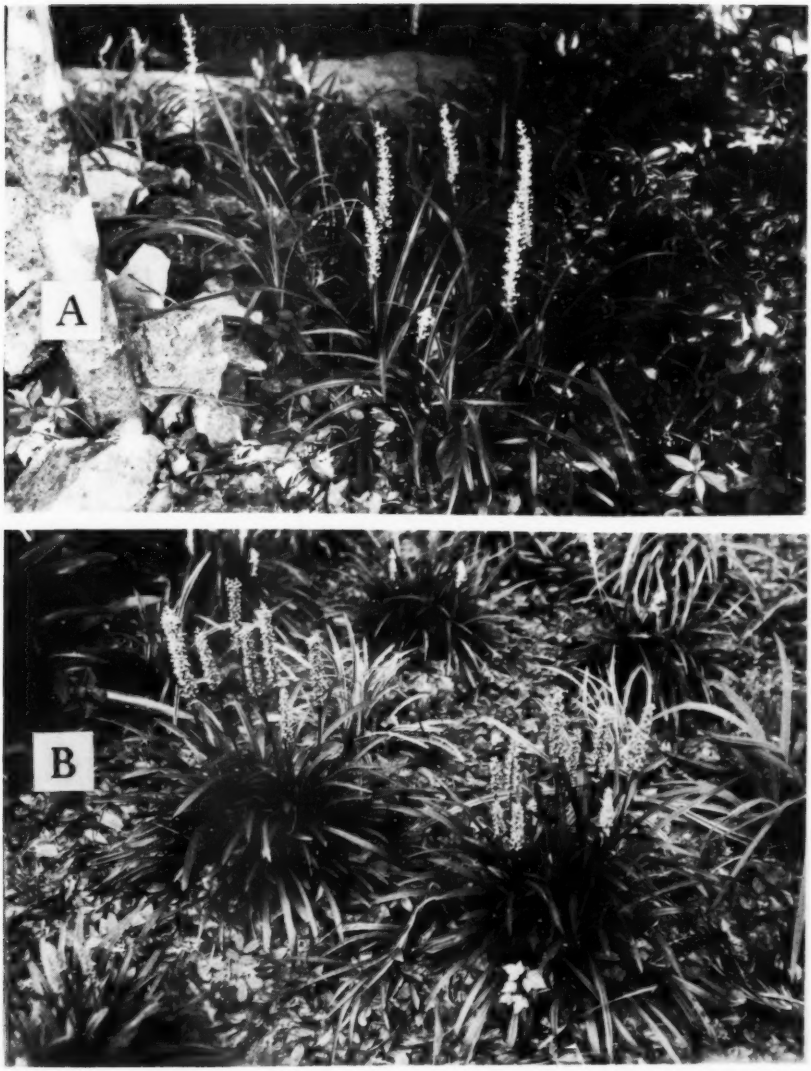


Fig. 59. Liriope Muscari. A, Cv. 'Eleven-O-Three', with exceptionally long racemes. B, Cv. 'Lilac Beauty'. Scapes are dark-colored.

pact as in 'Big Blue'. This cultivar is adapted to partial or full shade and not to full sunshine, as its foliage is injured by strong sunlight. It was raised from seed by W. L. Monroe, Atlanta, Georgia, and first offered for sale in the season September 1957 to April 1958, in a printed pamphlet.

'Monroe No. 2' ('Christmas Tree'). This garden variety of liriope is strikingly different from all others belonging to or derived from L. Muscari. It grows in rather open clumps with curved leaves, to 50 cm. long, bent almost in a half-circle. Its scape is stout, to 33 cm. long, erect, carrying the raceme well above the foliage mass. The rachis is branched, the lower branches longer, giving the raceme a conical shape, 2.5 cm. or somewhat wider at the base. Flower-buds are abundant and light violet in color. They do not open but remain attached in the raceme until they are dried. Valuable as a cut flower because of the long-lasting buds. Raised from seed and introduced by W. L. Monroe at the same time as the white sort ('Monroe No. 1').

'Silver Banded' is a slow-growing variety, forming low compact clumps with many racemes, buds, and flowers. These are compact, dark violet in color, and borne among the curvature of the leaves. At the base of the perianth there is a well-defined short projection (1 mm. long). The leaves are variegated with a narrow yellowish band along each leaf-margin. These bands become white later and still later turn green. Valuable as a variety of low growth.

'Variegata'. Leaves variegated (striped), with green centers and yellow or whitish-yellow margins becoming over-all dark green with age, to 9 mm. wide, to 46.5 cm. long, scape violet, to 28.5 cm. long, stout, rachis dark violet, to 11 cm. long, ridged, raceme open, 1.6 cm. wide, fascicles with 3-5 dark violet buds or flowers.

The origin of this liriope is obscure; it may be that it originated in Japan. It certainly is not a sport of the species L. Muscari. The general habit of the plant and the raceme are not unlike those of other garden forms that have originated as seedlings of L. Muscari, and it is best placed, not as a botanical, but as a garden variety. It is a decorative sort and very showy when the new leaves have grown to full size, particularly when planted among green sorts of liriope or against a background of some other kind of green foliage.

The peculiarity of the variegations in the leaves of this liriope, disappearing with age, is worthy of note. Variegated when they emerge, the coloring lasts for several months but becomes plain green by the time the leaves are a year old. The change-over does not occur suddenly but takes place gradually and requires some time for the transition.

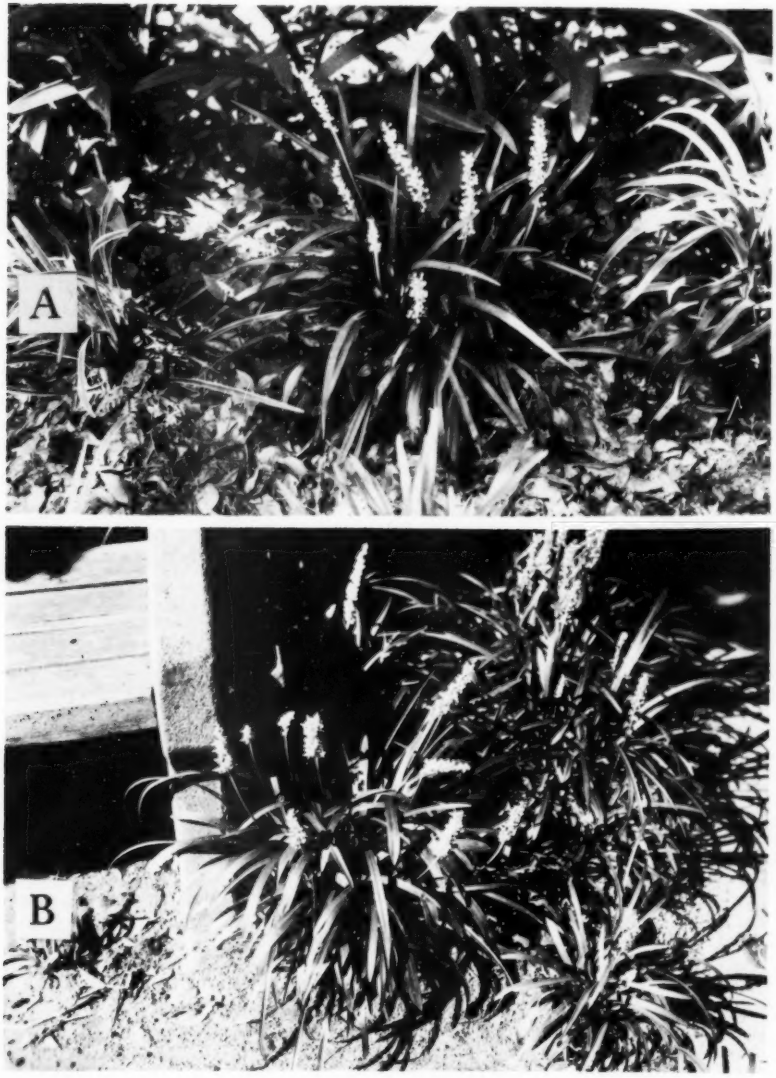


Fig. 60. Liriope Muscari. A, Cv. 'Munroe No. 1', with pure white flowers B, Cv. 'Munroe No. 2' (plant in foreground next to bench).

Liriope spicata Loureiro, Flora Cochinchinensis: 201. 1790.

Ophiopogon spicatus Loddiges, Botanical Cabinet: t. 694. 1822.

Rhizomatous perennial with slender wide-spreading rhizomes, forming a compact ground cover; leaves grass-like, green, semi-erect or decumbent, 14-43 cm. long by 3-7 mm. wide, shallowly channeled on upper surface, midrib prominent beneath, paralleled by about 9 narrow striae, apex tapered, blunt, margin with very fine scattered hyaline serrulations; scape slender, 1-2 mm. diameter, erect, light violet-brown, deeper-colored toward base, 12-21 cm. long; raceme short, 2-5 cm. long, not rising much above foliage mass, rachis pale violet, fascicles with 3-6 flowers and buds, medium to closely spaced, flower-bracts 5 mm. long, pale green; flowers pale violet to almost white, 7-8 mm. wide, tube distinct, short, 1 mm. long, stamens clustered, one usually subtending the stigma or beside it; fruit globose, black, lustrous, 7-9 mm. in diameter; seed with thin brown covering; root system abundant, fibrous, with many, somewhat moniliform, tuberoids.

Liriope spicata is especially valuable as a ground cover. For this use it is surpassed by no other plant in areas to which it is adapted. Divisions, preferably set in spring, 6-8 inches apart, will give good coverage in two seasons of growth. Usually it is best to cut it quite close to the ground every year in spring to remove leaves that may have been injured during the winter dormant season. Even though mowed from time to time, it persists.

Acknowledgments

Through the years in which plants belonging to the genera Ophiopogon and Liriope have been collected, grown, and studied, help has been received from many different individuals. Plants have been received from Messrs. J. Howard Asper, George Riegel, Sam C. Hjort, and the late George Willis. Mr. Eugene Griffith has been interested and most helpful in sending plants from the United States Plant Introduction Garden at Glenn Dale, Maryland. Dr. W. J. Dress has contributed the Latin description of L. gigantea. Drawings of flowers and flower parts are by Miss Esther Coogle. Photographs have been contributed by Mr. P. M. Parthemore and Mr. Ralph J. Sneeringer. Mr. Frederic P. Lee has helped with notes, suggestions, and criticisms. To all of these the author is very grateful and sincere thanks are extended.

Book Review

Flora of New Zealand, volume 1, by H. H. Allan. liv + 1085 pp., with 40 figs., and 4 colored maps (front and back end-papers). R. E. Owen, Government Printer, Wellington, New Zealand. 1961. £5. 5. 0 [$14. 70].

Anyone familiar with the second edition of Cheeseman's Manual of the New Zealand Flora, published some 36 years ago, at first will probably wonder at the size of the present volume. Its size is deceiving, and though the monocotyledons are not included, all other vascular plants are described in the conventional detailed manner; there are 116 families, arranged in the sequence recommended by Hutchinson, 290 genera and 1457 species. Where necessary, subspecific descriptions are given. Dr. Allan died in 1957 before the manuscript was completed, and therefore the project was completed under the skillful supervision of Miss Lucy B. Moore.

In addition to the keys, glossary, treatment of the taxa, index, list of abbreviations of terms and author's names, and a list of Maori names of plants, there are two other noteworthy features. One is the synopsis of classes and orders which give concise descriptions of each, and the other is a section on the extensive bibliography dealing with New Zealand plants, chronologically arranged from 1769 through 1958; all references to Das Pflanzenreich and Die Pflanzenfamilien are intentionally omitted.

The format is attractive and the use of India paper allows the volume to be small in spite of the fact that it comprises 1085 pages. Three sizes of type have been used and the reader may, with justification, object to the smallest print, which is used throughout the text for necessary explanatory notes. These notes are usually of 1 or 2 paragraphs, but sometimes, as in Hebe, they run to several pages. The botanist who likes to make notes in his manual may be disappointed in the extremely narrow margins. The use of abbreviations is excessive, since more than the usual abbreviations have been employed; some are followed by periods and others are not. Keys are sufficient in number and strictly dichotomous, but being of the non-indented kind, present all the problems inherent in keys of this sort.

For all who have occasion to use a flora of New Zealand, this is indeed a most welcome and excellent work, which achieves its primary purpose of providing a means of identification of the native flora in the New Zealand botanical region.

J. I.

Index to Volume 9

Abies
  Pindrow, 126, 127
  Pinsapo, 126, 127
  Vasconcellosiana, 126, 127
    'Amaral Franco', 127
Acinos, 125
  arvensis, 125
  thymoides, 125
Adelocaryum, 5
  anchusoides, 7
Allan, H. H., 159
Anatomy of the Monocotyledons, I. Gramineae (Review) 51
Anchusa, 7
  azurea, 4
Andromeda, 57, 58
  acuminata, 64
  axillaris, 60, 62
  catesbaei, 60, 62
  Fontanesiana, 62
  populifolia, 64
  racemosa, 64
  recurva, 66
Aneilma, 13
Anthericum, 30
  Bichetii, 35, 36
  comosum, 42
  elatum, 37, 39
  macrophyllum, 47
  Sternbergianum, 42
Aploleia, 13-19
  diffusa, 13, 14, 17
  monandra, 13-15, 17-19
  multiflora, 14-17
Armeria, 53
Arnebia, 12
Artanthe
  decurrens, 100
  magnifica, 100
Asparagus graminifolius, 150
Asphodelus, 30
  capensis, 37, 39
  foliis planis, etc., 37, 39
Australian Plants (Journal), 12

Barba Serpentina, 136
Basil-thyme, 125
Bergenia, 20, 25
  bifolia, 21
  ciliata, 23, 25, 26
  cordifolia, 23, 25-28
    compacta, 23
    'Purpurea', 26
Bergenia (cont.)
  crassifolia, 21, 23, 25-27
  hybrida, 28
  ligulata, 21, 25
    Leichtlinii, 21
    speciosa, 20, 23, 27
  newryensis, 26, 28
  ornata, 20, 21, 23, 24, 26
  purpurascens, 26-28
  Schmidtii, 20-26
  Smithii, 26, 28
  Stracheyi, 23, 25, 26
    alba, 23
    Schmidtii, 20
  subciliata, 21, 23-26
Book Reviews, 51-52, 84-88, 118-120, 159
Boraginaceae, 1-12, 56, 93
Borago, 6
  officinalis, 10
Bourreria, 1, 3, 5
Boxwood, 129
Brassia, 121
  antherotes, 121, 123, 124
    longissima, 122, 124
  Lawrenceana, 121
    longissima, 121-124
  longissima, 121, 123, 124
    minor, 121, 123, 124
Brauneria, 76, 82
  angustifolia, 77, 82
  pallida, 77, 82
  purpurea, 77, 82
Brunnera, 10
Bruns, Heinrich, 128, 129
Buglossoides, 11
Bunting, George S.
  The Cultivated Species of Spathiphyllum, 109
Buxus sempervirens
  'Heinrich Bruns', 128, 129

Calamintha, 125
  arvensis, 125
Callisia, 13, 14
  delicatula, 17
  insignis, 15
  Martensiana, 15
  monandra, 13
  multiflora, 13, 15
  repens, 15
  scopulorum, 17, 19
  umbellulata, 17

Campanula
hondoensis, 91
latifolia,
Medium,
nobilis, 89, 91
punctata, 89-91
hondoensis, 90
punctata, 90, 91
Cerinthe, 12
major, 11
Chamaecyparis Lawsoniana
'Pena Park', 129
Chlorophytum, 29-50
alismaefolium, 31, 33, 34
amaniense, 29, 32-34
arundinaceum, 33, 35
attenuatum, 43, 45
Bichetii, 31, 35, 36
Bischii, 35
brevipes, 31, 37
capense, 32, 37-41, 104-108
'Variegatum', 41
comosum, 29, 32, 41, 42, 105, 106, 108
'Mandaianum', 42, 105
'Variegatum', 42
elatum, 37, 39-41, 105
vittatum, 105, 106
gramineum madagascariense, 33, 42
Heyneanum, 43
Heynei, 33, 43
Hoffmannii, 31, 43
Huyghei, 31, 43
indicum, 33, 42-45
inornatum, 30, 31, 45, 46
laxum javanicum, 32, 47
macrophyllum, 33, 34, 47
madagascariense, 42
Mannii, 31, 47
nepalense, 32, 49
orchidastrum, 32, 48, 49
Schimperi, 34
Seretii, 32, 48
sparsiflorum, 32, 50
Sternbergianum, 42
togoense, 31, 32, 50
ukambense, 32, 50
undulatum, 49
usambarense, 31, 32, 50
Commelina multiflora, 15
Commelinaceae, 13-19, 53, 54, 56
Comfrey, 93, 95
Common, 99
Prickly, 99
Russian, 93, 95, 99
Coneflower, 67, 68, 70
Convallaria, 136
spicata, 144, 147
Cordia, 1, 3, 5
Sebestena, 4
Crataegus monogyna
'Pink Corkscrew', 129
Cryptantha, 5, 7, 10
intermedia, 8
Cultivated Palms (Review), 84, 85
Cyanotis veldthoutiana, 83
Cynoglossum, 5
Cypress, Lawson, 129
Dasystachys, 29
Dog-hobble, 62
Dracontium, 111
Dracopis, 67, 68, 70, 75, 76, 82
amplexicaulis, 76, 82
Dress, William J.
Chlorophytum (Liliaceae) in Cultivation, 29
Notes on the Cultivated Compositae 6. The Coneflowers: Dracopis, Echinacea, Ratibida, and Rudbeckia, 67
Campanula punctata, 90
Photinia × Fraseri, a New Hybrid, 101
Chlorophytum capense and C. comosum, 104

Echinacea, 67, 68, 70, 76, 77, 82
angustifolia, 76, 77, 82
pallida, 76, 77, 82, 83
angustifolia, 77, 82
purpurea, 76, 77, 79, 82, 83
'Alba', 78
'Abendsonne', 78
'Auslese', 78
'Leuchtstern', 78
'Sombero', 78
'The King', 78
'White King', 78
'White Lustre', 78
'White Prince', 78
Echioides, 12
Echium, 5
plantagineum, 4
Economic Botany (Journal), 103
Ehretia, 1, 3, 5
microphylla, 3
Erica, 57, 58, 131
cerinthoides, 131
'Evening Glow', 131
Ericaceae, 57, 58
Eritrichium, 7
elongatum, 8
Errata, Volume 8 (1960), 52
Eubotrys, 58
racemosa, 64
recurva, 66

Flora of New Zealand, Vol. 1 (Review), 159
Flora of the Santa Cruz Mountains of California, A Manual of the Vascular Plants (Review), 119

Franco, João do Amaral, 128, 129
Fraser catalogue, 80, 81
Fraser Nurseries, 101

Ginkgo biloba 'St. Cloud', 130, 131
Goldenglow, 74
Griffinia Rochae, 28

Hackelia, 5
  Jessicae, 4
Hawthorn, 129
Heliotropium, 3, 5
  arborescens, 4
Hertrich, William, 84, 85
Hume, Harold H.
  The Ophiopogon-Liriope Complex, 134

Ingram, John
  Studies in the Cultivated Boraginaceae
    4. A Key to the Genera, 1
    5. Symphytum, 92
  The Genera of Cultivated Boraginaceae - an addition, 56
  Book Reviews, 51, 118-120, 159
  Studies in the Cultivated Ericaceae
    1. Leucothoe, 57

Lappula, 5
  Redowskii, 4
Lawrence, George H. M.
  The Name of the Basil-thyme, Acinos arvensis, 125
Ledin, R. Bruce, 84
Lee, Robert E.
  Pollen Dimorphism in Tripogandra grandiflora, 53
Lepachys, 78, 80, 82
  columnaris, 80, 82
  columnifera, 79, 80, 82
  pulcherrima, 81, 82
  pinnata, 81, 82
  Tagetes, 81, 82
Leptocallisia, 13, 14
  monandra, 17
  multiflora, 15
  umbellulata, 13, 14, 17
Leucothoe, 57-66
  acuminata, 64, 66
  axillaris, 60, 62, 64, 66
  Catesbaei, 62, 66
  Davisiae, 60, 61, 66
  drooping, 62
  editorum, 62, 64, 66
  elongata, 66
  Fontanesiana, 59, 60, 62, 64, 66
  Grayana, 60, 64-66
  Keiskei, 60, 63, 64, 66
  platyphylla, 60, 66
  populifolia, 60, 63, 64, 66
  racemosa, 60, 64-66
    elongata, 64, 66
Leucothoe (cont.)
    recurva, 60, 65. 66
    redtwig, 66
Lily-turf, 136, 138
  Dwarf, 143
Lindelofia, 5
  longiflora, 9
Liriope, 135, 136, 138, 140, 144, 158
  exiliflora, 134, 144-150, 152
  gigantea, 137, 148, 150, 151, 158
  graminifolia, 136, 150, 152
  Muscari, 138, 146-150, 152-154, 156
    'Big Blue', 152, 154, 156
    'Blue Spire', 152
    'Christmas Tree', 156
    'Curly Twist', 154
    'Eleven-O-Three', 154, 155
    exiliflora, 144, 147
    'Gold-banded', 154
    'Lilac Beauty', 154, 155
    'Majestic', 154
    'Munroe No. 1', 154, 156, 157
    'Munroe No. 2', 139, 156, 157
    'Munroe White', 154
    'Silver Banded', 156
    'Variegata', 152-154, 156
  spicata, 136, 138, 150, 152, 158
Lithodora, 11
  fruticosa, 8
Lithospermum, 7, 12
  Hancockianum, 12

Massowia, 111
Mauve, Mrs. A. A., 105, 106
McCurrach, James C., 84, 86-88
Megasea
  cordifolia, 26
  hybrida splendens, 26
  ligulata, 26
  ornata, 21, 26
  purpurascens, 26
  speciosa, 21, 24
Mertensia, 9, 11, 95
  paniculata, 2
Metcalfe, C. R., 51
Meyer, Frederick G.
  New Cultivars of Woody Ornamentals from Europe, 126
Micromeria, 125
Moltkia, 12
  aurea, 12
  Doerfleri, 8
Mondo, 136
Mondo grass, 138, 143
Monroe, W. L., 156
Moore, Harold E., Jr.
  The Genus Aploleia (Commelinaceae), 13
  Tradescantia sillamontana vs. T. pexata, 83
  Book Reviews, 84-88

Muirhead, Desmond, 84, 85
Murdannia, 13
Myosotidium, 6
Myosotis, 10
  sylvatica, 8

Nolina javanicum, 47

Obeliscaria, 78, 82
  columnaris, 80, 82
  pinnata, 82
  pulcherrima, 81, 82
Obelisteca, 78, 82
Omphalodes, 6, 9
  linifolia, 8
Onosma, 12
Ophiopogon, 135, 136, 138, 140, 144, 158
  arabicus, 144
  Jaburan, 136, 138-142
    'Vittata', 142
  japonicus, 135, 136, 138, 140-143
  Muscari, 152
  spicatus, 158
Ornithogalum indicum, 43, 45

Padilla, Victoria, 120
Palms (Review), 84, 85
Palms and Cycads (Review) 84, 85
Palms of the World (Review), 84-88
Pentaglottis, 7
  sempervirens, 4
Phalangium, 30
  attenuatum, 43, 44
  Bichei, 35, 36
  Bischii, 35
  comosum, 42
  elatum, 38
  indicum, 43
  nepalense, 49
Photinia, 101
  Fraseri, 101-103
    'Birmingham', 102, 103
  glabra, 101-103
  serrulata, 101-103
  villosa, 101
Piper, 100
  bicolor, 100
  decurrens, 100
  magnificum, 100
Plagiobothrys, 5, 11
  nothofulvus, 8
Pollen dimorphism, 53-56
Polygonastrum, 136
Primula, 53
  farinosa, 53
  veris, 53
Pulmonaria, 11
  lutea, 96
  saccharata, 8

Ratibida, 67, 68, 70, 76, 80-82
  columnaris, 80, 82
  columnifera, 80-82
    pulcherrima, 81, 82
  pinnata, 80-82
  pulcherrima, 81
  Tagetes, 80-83
Rhoeo
  discolor, 34
  spathacea, 34
Rhopala Corcovadensis, 131
Riegel Plant Co., 154
Roupala macrophylla 'Corcovadensis', 131
Rudbeckia, 67, 68, 70, 76, 78, 82
  amplexicaulis, 75, 76, 82
  bicolor, 73, 82
    glauca, 70, 71, 82
  columnaris, 78, 80-82
  columnifera, 78, 80-82
  Deamii, 72, 82
  flava, 73, 82
  fulgida, 70-72, 82
    fulgida, 70, 72, 82
    Deamii, 70, 72, 82, 83
    speciosa, 70, 72, 82, 83
    Sullivantii, 70, 72, 82, 83
      'Gold Storm', 72
      'Goldsturm', 72
      'Oriole', 72
  grandiflora, 70, 72, 82
  hirta, 70-73, 82, 83
    hirta, 71, 73, 83
    monticola, 73, 83
    pulcherrima, 71, 73, 82, 83
      'Autumn Forest', 73
      'Autumn Frost', 73
      'Autumn Tints', 73
      'Autumn Woods', 73
      'Bicolor Superba', 73
      'Gloriosa Daisy', 74
      'Gloriosa Double Daisy', 74
      'Golden Sunset', 74
      'Gold Flame', 73
      'Goldflamme', 73
      'Harmony', 74
      'Herbstwald', 73
      'Kelvedon Star', 73
      'Meine Freude', 73
      'Mon Plaisir', 73
      'My Joy', 73
      'Sonnenuntergang', 73
      'Spoutnik', 74
      'Starlight', 74
      'Star of Kelvedon', 73
      'Sunset', 73
  laciniata, 70, 71, 74, 83
    'Gold Ball', 74
    'Golden Globe', 74
    'Goldquelle', 74
    'Hortensia', 74, 83
    'Soleil d'Or', 74

Rudbeckia (cont.)
maxima, 70, 74, 83
monticola, 73, 83
Newmanii, 72, 83
nitida, 70, 74, 75, 83
'Herbstsonne', 74, 75
occidentalis, 70, 75, 83
oppositifolia, 70
pallida, 77, 83
pinnata, 78, 81, 83
purpurea, 70, 77, 83
serotina, 73, 83
speciosa, 72, 83
Deamii, 72, 83
Newmanii, 72, 83
Sullivantii, 72, 83
subtomentosa, 71, 75, 83
Sullivantii, 72, 83
Tagetes, 81, 83
triloba, 69-71, 75, 83
Russell Gardens, 154

Satureja, 125
Saxifraga
cordifolia, 26
Leichtlinii, 21, 24
ligulata, 20, 22, 24, 26
Leichtlinii, 24
speciosa, 20, 21, 24-26
Leichtlinii, 24
ornata, 20, 23, 24
purpurascens, 26
Schmidtii, 20, 23, 24
speciosa, 21, 24, 26
Stracheyi, 21, 24
Schmidtii, 20
thysanodes, 24, 25
Saxifragaceae, 20
Schwarz, O.
Note on the Nomenclature of Piper magnificum, 100
Slateria, 136
Snake's-beard, 136
Society for Economic Botany, 103
Solenanthus, 5
apenninus, 6
Southern California Gardens (Review), 120
Spaargaren Nursery, 129
Spathiphyllum, 109, 111, 117
blandum, 111, 114, 117
candidum, 111, 117
cannaefolium, 111, 113-115, 117
Clevelandii, 111, 117
'Clevelandii', 113, 114, 117
cochlearispathum, 110, 111, 114, 117
commutatum, 111, 113-115, 117
cordatum, 117
floribundum, 113, 114, 116, 117
Friedrichsthalii, 112, 113, 117
grandiflorum, 117

Spathiphyllum (cont.)
hybridum, 117
Kochii, 111, 113, 114, 117
lanceaefolium, 111
Patinii, 114, 116, 117
phryniifolium, 112-114, 117
quindiuense, 113
Wallisii, 111
Symphytum, 56, 93, 95
asperrimum, 99
asperum, 93, 95, 98, 99
caucasicum, 93, 95, 97
cordatum, 96
grandiflorum, 93, 95, 96
officinale, 92, 93, 95, 99
'Variegatum', 99
orientale, 95, 97, 99
peregrinum, 99
tauricum, 95, 97, 99
uplandicum, 93-95, 99

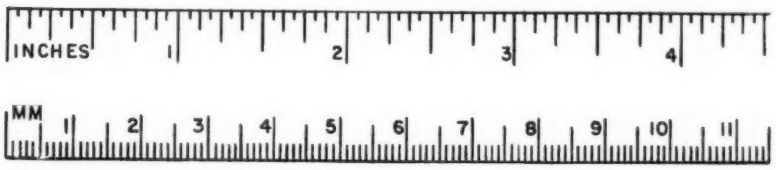
Table-grass, 136
Taxus baccata
'Adpressa', 133
'Amersfoort', 132, 133
Teuscher, Henry
Brassia longissima vs. B. antherotes, 121
Thomas, John Hunter, 119
Thomasville Nurseries, 154
Thymus, 125
Acinos, 125
Trachystemon, 6
orientale, 4
Tradescantia
Martensiana, 15, 17
monandra, 13, 17
pexata, 83
sillamontana, 83
velutina, 83
villosa, 83
'White Gossamer', 83
'White Velvet', 83
Trees, Shrubs and Woody Vines of the Southwest (Review), 118
Tripogandra, 15, 53, 54
cumanensis, 54, 56
floribunda, 15
grandiflora, 53-56
rosea, 15
Warszewicziana, 15

Validation of the Name Griffinia Rochae, 28
Vines, Robert A., 118

Yeo, Peter F.
Two Bergenia Hybrids, 20
Yew, European, 133
Yuncker, T. G., 100

ABBREVIATIONS USED IN BAILEYA

ann.	annual	dm.	decimeter	lf.	leaf
bien.	biennial	fl.	flower	lft.	leaflet
br.	branch	fls.	flowers	lvs.	leaves
brt.	branchlet	flt.	floret	mm.	millimeter
caps.	capsule	fr.	fruit	per.	perennial
cl.	clone	ft.	foot	segm.	segment
cm.	centimeter	hort.	horticultural	st.	stem
cv.	cultivar	in.	inch	sts.	stems
diam.	diameter	infl.	inflorescence	var.	variety

METRIC - ENGLISH EQUIVALENTS (approximate)

6 mm. - 1/4 in.	10 cm. - 4 in.	10 mm. - 1 cm.
12 mm. - 1/2 in.	1 dm. - 4 in.	10 cm. - 1 dm.
25 mm. - 1 in.	3 dm. - 1 ft.	10 dm. - 1 meter
2.5 cm. - 1 in.	10 dm. - 1 yd.	
5 cm. - 2 in.	1 m. - 39 in.